

TSC321/322/323/324 NAND Gates

- Quad 2-Input (Active Pullup)
- Dual 5-Input (Active Pullup)
- Quad 2-Input (Open Collector)
- Quad 2-Input (Passive Pullup)

Features

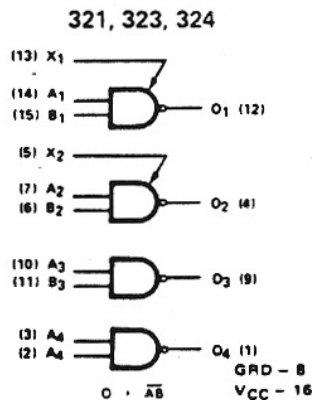
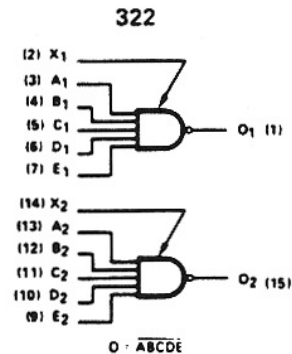
321/322

- IDEAL FOR DRIVING LINES UP TO 10 FEET
- 5mA DRIVE CURRENT IN "1" STATE
- EXPANDER INPUTS
- ACTIVE PULLUP

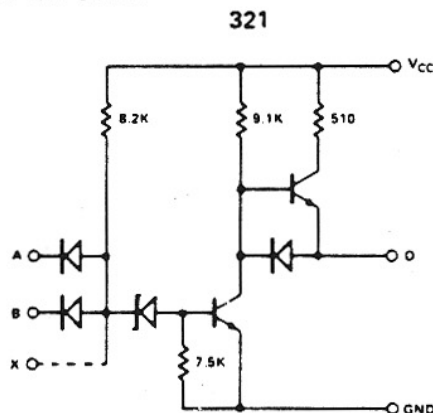
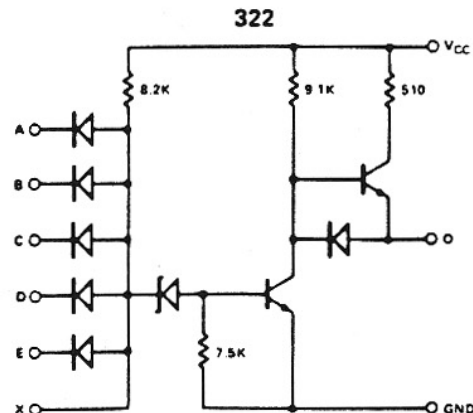
323/324

- COLLECTOR OR'ABLE
- EXPANDER INPUTS
- 323 SINKS UP TO 11.5 mA (C TYPE) OR 14.0 mA (A TYPE)
- 323 OUTPUT LEVELS ADJUSTABLE TO DTL, TTL OR MOS LEVELS
- 324 HAS PULLUP RESISTORS ON CHIP
- 324 SINKS UP TO 16.8 mA (C TYPE) OR 20.8 mA (A TYPE)

Logic Diagrams

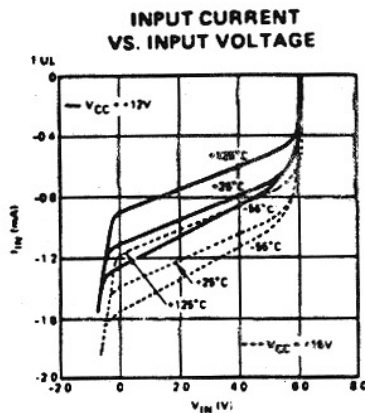
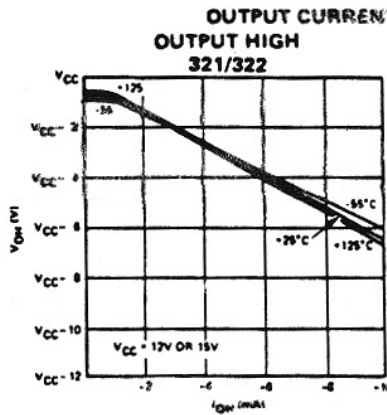
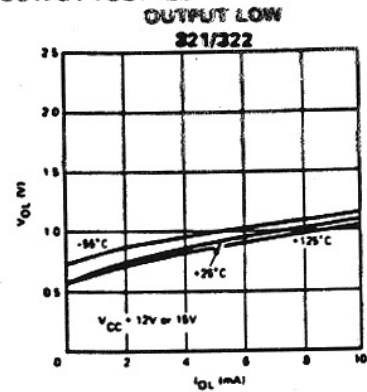
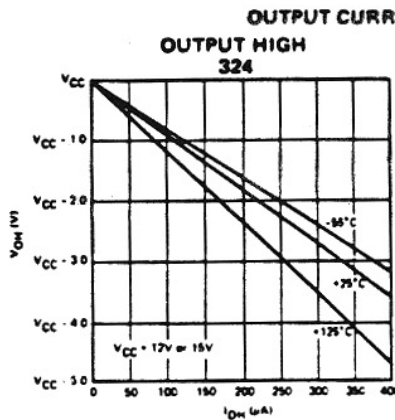
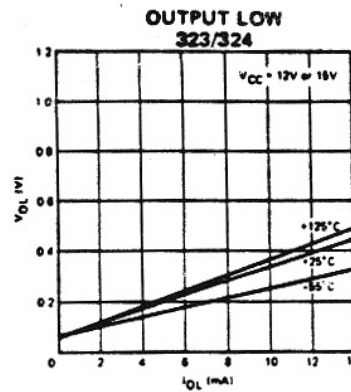


Equivalent Circuits



NAND Gates 321, 322, 323, 324

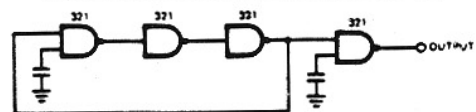
Typical Performance Characteristics



Typical Applications

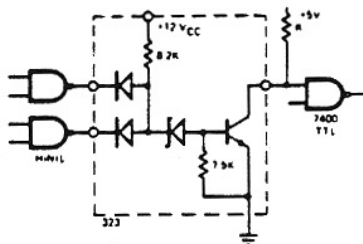
Rules for selecting external resistors and calculating fanout with collectors OR'd are given in the applications notes. The external resistor of the 323 may be connected to a voltage other than V_{CC} to adjust the output voltage level. The expandable gates may be provided any number of inputs by adding 331 gate expanders or 1N914 diodes (or any 20-volt silicon diodes) to the expander inputs.

FREE-RUNNING MULTIVIBRATOR



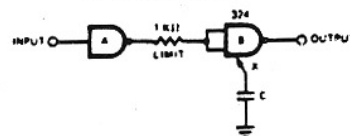
This self-starting circuit even works without capacitors.
 $PW \approx 1.5 \mu\text{sec}$. $f \approx 3\text{MHz}$.

TTL INTERFACE



Choose the value of pullup resistor R by the rules given in the applications notes, with $V_{CC} = 5V$.

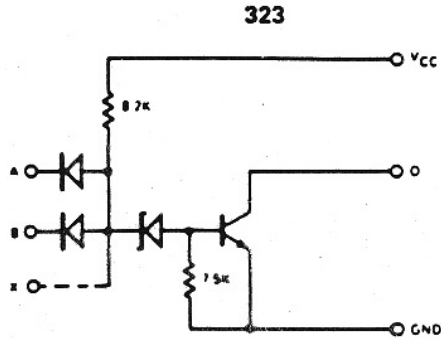
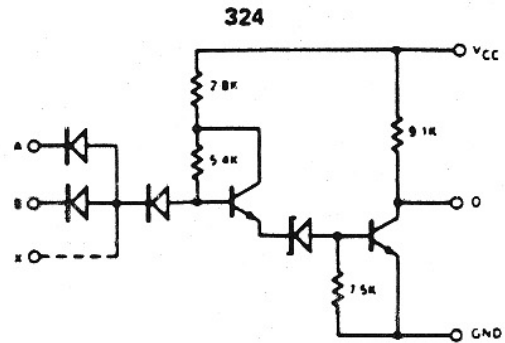
SYSTEM MONITOR



This circuit is used in applications such as detecting presence of data on a normally quiet line, or detecting malfunctions represented by an absence of pulses on a normally active line. A steady succession of pulses at the input holds the output high, but the output goes low if the input remains low for longer than a minimum time established by the value of C . A high input allows C to discharge, switching gate B to a high output. However, a low input causes C to charge at a rate $t = C(8.2K)$ where $8.2K$ is B 's input resistor (internal). For B 's output to switch to low, the input to gate A must go low long enough for C to charge above the threshold of gate B . Any new input pulse retriggers the circuit and switches the output to high.

NAND Gates 321, 322, 323, 324

Equivalent Circuits (contd.)



Specifications

321

I_{CC} (WORST-CASE)	15 mA @ 13V, 20 mA @ 16V	
t_{PD}	200 ns	300 ns
I/O FUNCTION FOR t_{PD}	A+O-	A-O+

322

I_{CC} (WORST-CASE)	8 mA @ 13V, 11 mA @ 16V	
t_{PD}	190 ns	550 ns
I/O FUNCTION FOR t_{PD}	A+O-	A-O+

323

I_{CC} (WORST-CASE)	5.5 mA @ 13V, 8 mA @ 16V	
t_{PD}	160 ns	400 ns
I/O FUNCTION FOR t_{PD}	A+O-	A-O+

324

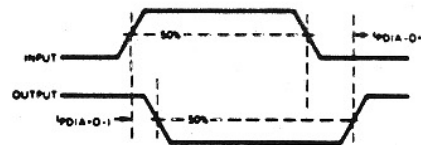
I_{CC} (WORST-CASE)	28 mA @ 13V, 40 mA @ 16V	
t_{PD}	200 ns	600 ns
I/O FUNCTION FOR t_{PD}	A+O-	A-O+

NOTE:

I_{CC} is tested at $V_{CC} + 1$ Volt (+13V for C type and +16V for A type) and is guaranteed across the applicable temp range. t_{PD} is guaranteed at $V_{CC} \pm 1V$ and across the applicable temp range with the output loaded with 5 unit loads.

See page 12 for electrical summary data.

Switching Time Waveform



Loading Table

PINS	FUNCTION	LOADING
A, B, A-E	Input Expanders	1 UL
X		Each diode tied to X_1 or X_2 is 1 unit load
O	Outputs	5 UL (321, 322, 324) 7 UL (324 with supplemental 10 k Ω pullup resistor)

323 also handles 4 TTL loads at 400 mV.